

LK6677-LAS

0044670

LOCKHEED MARTIN *A*

Lockheed Analytical Services

Ms. Joan Kessner
Bechtel Hanford, Inc.
P. O. Box 969
1022 Lee Blvd.
Richland, WA 99352



ANALYTICAL DATA REPORT

FOR

METALS, CHLORIDE, FLUORIDE, NITRATE,
NITRITE, PHOSPHATE, SULFATE, URANIUM
TOTAL KPA, VOLATILE ORGANICS,
AND GROSS ALPHA/BETA



LOG-IN NUMBER: L6677

QUOTATION NUMBER: 0400000-B

SAF: B96-083

DOCUMENT FILE NUMBER: 0326596

BHI DOCUMENT FILE NO.: 340

SDG NUMBER: LK6677

0001

Sample Disposition Record

Control #: 96-0055
Revision #: 0
Date Initiated: 03/29/96

Section 1 - BACKGROUND

SAF #: B96-083

OU: 300-FF-2

Project ID: 300-FF-2 LFI

Task ID: 3

Sampling Event: 300-FF-2 Groundwater Sampling--Round 2

Laboratory: Quanterra

Project Coordinator: ME David

Task Manager: MJ Galgoul

Section 2 - SAMPLE INFORMATION

Number of Samples: All samples associated with B96-083 requiring Phosphorus analysis.

ID Numbers: All samples associated with B96-083 requiring Phosphorus analysis.

Matrix: Water

Collection Date: Approximately 3/19/96 through 4/2/96

Section 3 - ISSUE

Class: Lab Direction

NCR Number: N/A

Type: Revision of Direction--Change in method number

Description: The SAF call for Total Phosphorus to be run to EPA method 365.4. The laboratory is currently configured to analyze for Total Phosphorus via EPA method 365.1.

N/A

NCR Validation (Print/Sign)

Date

Section 4 - DISPOSITION

Type: Repair

Description: For all samples associated with SAF B96-083 requiring Total Phosphorus, the analysis will be performed to EPA method number 365.4.

ME David

Date

Project Coordinator (Print/Sign)

MJ Galgoul

Date

Task Manager (Print/Sign)

N/A

QA (Print/Sign)

Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A

Inspection Results: N/A

N/A

Inspector (Print/Sign)

Date

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

LOCKHEED MARTIN 

May 1, 1996

Joan Kessner
Bechtel Hanford, Inc.
3350 George Washington Way
MS B1-35
Richland, WA 99352

RE: Log-in No: L6677
Quotation No: Q400000-B
SAF: B96-083
Document File No: 0326596
WHC Document Control No: 340
SDG No: LK6677



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 26 March 1996. The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples for nitrate/nitrite analysis were not received in time to meet the analytical holding time requirements.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen M. Hall at (509) 375-4741.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Sincerely,



Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

0004

**CASE NARRATIVE
INORGANIC NON METALS ANALYSES**

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- One water sample was received for LK6677 and analyzed in batch 326 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following samples:

Client ID	LAL #		Method
BOH877	L6677-14	MS, DUP	300.0 Chloride, Fluoride, Nitrate as Nitrogen, Nitrite as Nitrogen, Orthophosphate and Sulfate

Holding Time Requirements

- All samples were analyzed within the method-specific holding times with the following exception of Method 300.0 Nitrate as Nitrogen, Nitrite as Nitrogen, and Orthophosphate. The associated samples are flagged with an "H".

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Kay McCann
Prepared By

April 2, 1996
Date

CASE NARRATIVE INORGANIC METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

Preparation and Analysis Requirements

All samples were received on March 26 1996. The samples were logged in as L6677 and were prepared and analyzed in batches 326 btT for total metals and 326 btD for dissolved metals.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Shellee McGrath
Prepared By

May 1, 1996
Date

0006

CASE NARRATIVE INORGANIC TOTAL URANIUM ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, and matrix spike duplicate samples.

Holding Time Requirements

All holding time requirements were met.

Total Uranium

The Total Uranium analysis was performed using LAL-91-SOP-0168. All samples were prepared in Workgroup U TOTAL KPA LAL-0168 35539 with a Method Blank (MBB), Laboratory Control Sample (LCS1), Duplicate (DUP) and Matrix Spike (MS). No problems were encountered during preparation or analysis. All QC criteria were met.

Shellee McGrath
Prepared By

April 26, 1996
Date

0007

CASE NARRATIVE ORGANIC ANALYSES

Analytical Method 8260 Volatiles Appendix IX

Analytical Batch 040296-8260-D1

Note: Sample BOH879 (L6677-7) was the native sample used for the matrix spike (35510MS) and matrix spike duplicate (35510MSD) analyzed in this analytical batch.

The MS, MSD, and laboratory control sample (35510LCS) solutions contained many target compounds in addition to the five (5) required spiked compounds.

The associated samples were analyzed within holding time on April 2, 1996. All instrument tunes, initial and continuing calibrations met QC criteria. Target compound Acetone was detected in the method blank (MB35510) but tentatively identified compounds (TICs) were not detected. All associated samples with a detected target compound as in the method blank were flagged with the qualifier "B". Surrogate recoveries were within QC limits except for Bromofluorobenzene with a slightly elevated recovery in sample BOH879 (35510MS). Compound recoveries were within QC limits in the MS, MSD, and LCS. The relative percent differences (RPDs) between the MS and MSD recoveries were within QC limits. All internal standard area counts and retention times were within QC limits for all samples. The concentration of Fluorotrichloromethane slightly exceeded the calibration range in 35510MS at 200 µg/L. The concentration of the highest standard analyzed for 8260 Volatiles is 200 µg/L, therefore, the concentration of 200 µg/L for Fluorotrichloromethane is still considered within the linear range.

Lockheed Analytical Services

Log-in No.: L6677
Quotation No.: Q400000-B
SAF: B96-083
Document File No.: 0326596
WHC Document File No.: 340
SDG No.: LK6677
Page No.: 5

CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control (QC) analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, and duplicate samples.

Holding Time Requirements

All holding time requirements were met.

NOTE: Chemical recoveries and minimum detectable activities (MDAs) can be found on the preparation and calculation sheets of the attached raw data for each method.

Analytical Method Gross Alpha/Beta

The gross alpha/beta analysis was performed using standard operating procedure, LAL-91-SOP-0060. The samples were analyzed in workgroup 35168. The instrument calibration verification met criteria. The method blank was within QC criteria. The beta laboratory control sample (LCS) and matrix spike recoveries were within QC criteria. The alpha LCS recovery was out of QC criteria. Since all other QC criteria were within limits, data quality is not believed to be adversely affected. The duplicate recoveries were within QC criteria. The MDA exceeded the reporting detection limit due to the residue weight limitations forcing a volume reduction. The associated samples were flagged with a "C" qualifier. No re-analyses were performed.

Yvonne M. Jacoby
Prepared By

April 11, 1996
Date

0009

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Apr 22 1996, 10:13 am

*Revised
Metals*

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L6677-1 TEMP 2 Location: RFG01-43A Water 1 S SCREENING	B0H877	22-MAR-96	26-MAR-96	30-APR-96
			Hold:18-SEP-96	
L6677-2 TEMP 2 "WITH TICS" "APPENDIX IX" Location: 130 Water 1 S 8260 VOLATILES	B0H877	22-MAR-96	26-MAR-96	30-APR-96
			Hold:05-APR-96	
L6677-3 TEMP 2 Location: 130	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-4 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-5 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-6 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-7 *MS/MSD TEMP 2 "WITH TICS" "APPENDIX IX" Location: 130 Water 1 S 8260 VOLATILES	B0H879	22-MAR-96	26-MAR-96	30-APR-96
			Hold:05-APR-96	
L6677-8 TEMP 2 Location: 130	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-9 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-10 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Apr 22 1996, 10:13 am

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L6677-11 TEMP 2 Location: RFG18-48A3	BOH879	22-MAR-96	26-MAR-96	30-APR-96
L6677-12 TEMP 2 Location: RFG01-07B Water 1 S 6010 ICP METALS	BOH877	22-MAR-96	26-MAR-96	30-APR-96
		Hold:18-SEP-96		
L6677-13 TEMP 2 "NO SUBSTITUTES FOR FURNACE" Location: RFG01-07B Water 1 S 7000 FURNACE METALS	BOH877	22-MAR-96	26-MAR-96	30-APR-96
		"METALS As,Pb,Se,Tl"		
		Hold:18-SEP-96		
L6677-14 TEMP 2 Location: RFG19-105C Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	BOH877	22-MAR-96	26-MAR-96	30-APR-96
		Hold:19-APR-96		
		Hold:19-APR-96		
		Hold:24-MAR-96		
		Hold:24-MAR-96		
		Hold:24-MAR-96		
		Hold:19-APR-96		
L6677-15 TEMP 2 Location: 156-022E Water 1 S GR ALP/BETA LAL-0060	BOH877	22-MAR-96	26-MAR-96	30-APR-96
		Hold:18-SEP-96		
L6677-16 TEMP 2 Location: 155 Water 1 S U TOTAL KPA (INORG)	BOH877	22-MAR-96	26-MAR-96	30-APR-96
		Hold:18-SEP-96		
L6677-17 TEMP 2 Location: RFG01-07B Filt H2O 15 S 6010 ICP METALS Filt H2O 15 S 6010 ICP TRACE	BOH878	22-MAR-96	26-MAR-96	30-APR-96
		Hold:18-SEP-96		
		Hold:18-SEP-96		
L6677-18 Location: Water 1 S EDD - DISK DEL. Water 1 S GCMS2 Water 1 S INORG TYPE 2 RPT	REPORT TYPE	26-MAR-96	26-MAR-96	30-APR-96

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Apr 22 1996, 10:13 am

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory	Client	Collect Date	Receive Date	Due PR Date
Sample Number	Sample Number			
Water	1 S RAD RPT TYPE 2			

*ADDED ICP TRACE

Ren K. HALL

Page 3

Signature: R. Callahan
Date: 4-22-96 0016

C306596

*Revised
PAK
3-27-96*

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Mar 27 1996, 10:42 am

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L6677-1 TEMP 2 Location: RFG01-43A Water 1 S SCREENING	B0H877	22-MAR-96	26-MAR-96	30-APR-96
*	Hold:18-SEP-96			
L6677-2 TEMP 2 "WITH TICS" Location: RFG18-48A3 Water 1 S 8260 VOLATILES	B0H877 "APPENDIX IX"	22-MAR-96	26-MAR-96	30-APR-96
*	Hold:05-APR-96			
L6677-3 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-4 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-5 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-6 TEMP 2 Location: RFG18-48A3	B0H877	22-MAR-96	26-MAR-96	30-APR-96
*				
L6677-7 TEMP 2 "WITH TICS" Location: RFG18-48A3 Water 1 S 8260 VOLATILES	B0H879 "APPENDIX IX"	22-MAR-96	26-MAR-96	30-APR-96
*	Hold:05-APR-96			
L6677-8 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-9 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-10 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96

Page 1

* Products changed.

MG

3-27-96

0017

0326596

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Mar 27 1996, 10:42 am

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L6677-11 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-12 TEMP 2 Location: RFG01-07B Water 1 S 6010 ICP METALS	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-13 TEMP 2 "NO SUBSTITUTES FOR FURNACE" Location: RFG01-07B Water 1 S 7000 FURNACE METALS	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-14 TEMP 2 Location: RFG01-07B Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-15 TEMP 2 Location: 156TMP-1 Water 1 S GR ALP/BETA LAL-0060	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-16 TEMP 2 Location: RFG01-07B Water 1 S U TOTAL KPA (INORG)	B0H877	22-MAR-96	26-MAR-96	30-APR-96
L6677-17 TEMP 2 Location: RFG01-07B Filt H2O 15 S 6010 ICP METALS	B0H878	22-MAR-96	26-MAR-96	30-APR-96
L6677-18 Location: Water 1 S EDD - DISK DEL. Water 1 S GCMS2 Water 1 S INORG TYPE 2 RPT Water 1 S RAD RPT TYPE 2	REPORT TYPE	26-MAR-96	26-MAR-96	30-APR-96

Page 2

Signature:

Date:

Paul C. Jones
3-28-96 0018

03265

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Mar 26 1996, 02:28 pm

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory	Client	Collect Date	Receive Date	Due PR Date
Sample Number	Sample Number			
L6677-1 TEMP 2	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: 156TMP-1 Water 1 S SCREENING		Hold:18-SEP-96		
L6677-2 TEMP 2 "WITH TICS" "APPENDIX IX"	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3 Water 1 S 8260A VOLATILES		Hold:05-APR-96		
L6677-3 TEMP 2	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-4 TEMP 2	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-5 TEMP 2	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-6 TEMP 2	B0H877	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-7 TEMP 2 "WITH TICS" "APPENDIX IX"	B0H879	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3 Water 1 S 8260A VOLATILES		Hold:05-APR-96		
L6677-8 TEMP 2	B0H879	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-9 TEMP 2	B0H879	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				
L6677-10 TEMP 2	B0H879	22-MAR-96	26-MAR-96	30-APR-96
Location: RFG18-48A3				

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Mar 26 1996, 02:28 pm

Login Number: L6677
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L6677-11 TEMP 2 Location: RFG18-48A3	B0H879	22-MAR-96	26-MAR-96	30-APR-96
L6677-12 TEMP 2 Location: 156TMP-1 Water 1 S 6010 ICP METALS	B0H877	22-MAR-96	26-MAR-96	30-APR-96
		Hold: 18-SEP-96		
L6677-13 TEMP 2 "NO SUBSTITUTES FOR FURNACE" Location: 156TMP-1 Water 1 S 7000 FURNACE METALS	B0H877	22-MAR-96	26-MAR-96	30-APR-96
		"METALS As, Pb, Se, Tl"		
		Hold: 18-SEP-96		
L6677-14 TEMP 2 Location: 156TMP-1 Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	B0H877	22-MAR-96	26-MAR-96	30-APR-96
		Hold: 19-APR-96		
		Hold: 19-APR-96		
		Hold: 24-MAR-96		
		Hold: 24-MAR-96		
		Hold: 24-MAR-96		
		Hold: 19-APR-96		
L6677-15 TEMP 2 Location: 156TMP-1 Water 1 S GR ALP/BETA LAL-0060	B0H877	22-MAR-96	26-MAR-96	30-APR-96
		Hold: 18-SEP-96		
L6677-16 TEMP 2 Location: 156TMP-1 Water 1 S U TOTAL KPA (INORG)	B0H877	22-MAR-96	26-MAR-96	30-APR-96
		Hold: 18-SEP-96		
L6677-17 TEMP 2 Location: 156TMP-1 Filt H2O 15 S 6010 ICP METALS	B0H878	22-MAR-96	26-MAR-96	30-APR-96
		Hold: 18-SEP-96		
L6677-18 Location: Water 1 S EDD - DISK DEL. Water 1 S GCMS2 Water 1 S INORG TYPE 2 RPT Water 1 S RAD RPT TYPE 2	REPORT TYPE	26-MAR-96	26-MAR-96	30-APR-96

Page 2

Signature: Paula Davis

Date: 3-26-96

0020

032457

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround

 Priority Normal

Collector <i>Doug Bowers</i>		Company Contact L. C. Hulstrom								Telephone (509) 372-9685			
Project Designation 300-FF-2 Groundwater Sampling		Sampling Location 316-4 Crib, 618-10 and 618-11 Burial Ground								SAF No. B96-083			
Ice Chest No. <i>RM #7</i>		Field Logbook No. <i>EFL - 1133 ~</i>								Method of Shipment Federal Express			
Shipped To Lockheed		Offsite Property No. <i>W96-0-0640-34</i>								Bill of Lading/Air Bill No. <i>290-4653-857</i>			
Possible Sample Hazards/Remarks				Preservation	HCl	HNO ₃	HNO ₃	Cool 4°C	HNO ₃	HNO ₃	None	HNO ₃	
				Type of Container	Gs	P/G	P/G	P/G	P/G	P/G	P/G	P/G	
				No. of Container(s)	5	1	1	1	1	1	1	1	
Special Handling and/or Storage Maintain samples between 2°C and 6°C.				Volume	40mL	500mL	500mL	500mL	1L	500mL	20mL	500mL	
SAMPLE ANALYSIS				VOA (App IX)	ICP Metals - TAL (Unfilter- ered)	As, Pb, Se, Ti	IC Anions - Cl, F, NO ₂ , NO ₃ , PO ₄ , SO ₄	Gross Alpha, Gross Beta	Total Uranium	Activity Scan	ICP Metals - TAL (Filtered)		
Sample No.	Matrix*	Date Sampled	Time Sampled										
BOH877	W	3-22-96	1032	X	X	X	X	X	X	X			
BOH878	W	3-22-96	1031								X		
BOH879	W	3-22-96	0720	X									
CHAIN OF POSSESSION		Sign/Print Names								SPECIAL INSTRUCTIONS			
Relinquished By <i>Doug Bowers</i>		Date/Time 3-22-96/1530	Received By <i>K. Urane/K. Trapp</i>	Date/Time 1530								Analysis for NO ₂ , NO ₃ , and PO ₄ by method EPA 300.0 are for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.	
Relinquished By <i>K. Urane/K. Trapp</i>		Date/Time 1033	Received By	Date/Time								The Activity Scan is for all samples listed on this chain of custody.	
Relinquished By		Date/Time	Received By	Date/Time									
Relinquished By		Date/Time	Received By	Date/Time									
LABORATORY SECTION		Received By <i>Anne Miller</i>	Title Sample Custodian								Date/Time 3-21-91 / 0900		
FINAL SAMPLE DISPOSITION		Disposal Method	Disposed By								Date/Time		

0087

NON-RADIOLOGICAL SHIPMENT RELEASE

The contents of this shipment #W96-0-0640-34 have been reviewed and contains no radioactive material and therefore, are not subject to radiological control requirements.

Original signed by:



Kris A. Smith, Manager
Project Radiological Controls

0022 03265

Environmental
Restoration
Contractor

ERC Team

Interoffice Memorandum

Job No. 22192
Written Response Required: NO
CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Codes: S830

TO: W. S. Thompson N1-28 **DATE:** February 29, 1996
G. C. Henckel H4-80

COPIES: K. A. Smith X0-23 **FROM:** S. K. De Mers *[Signature]*
T. L. Lafreniere X0-23
D. E. Gergely X0-23 Radiological Controls
T7-05/373-1913

SUBJECT: Total Activities for Off-Site Shipments of Groundwater Samples to NRC Licensed Laboratories

There is no need to perform total activities prior to offsite shipment to NRC licensed labs of samples taken from ground water wells located on the Hanford Site.

All wells reviewed to date for radiological content have shown no well with a total activity in excess of 2,000,000 pCi/l (2,000 pCi/gm), the Department Of Transportation limit for radioactive material. The highest activity in any known well is 1.56×10^6 pCi/l H³.

While this does not constitute any release from radiological controls for worker protection, it does allow samples to be shipped based on historical laboratory data and save the expense of doing radiochemical analysis.

A copy of the most recent analytical data should be provided to the NRC licensed laboratory with the samples being shipped or if no data is available for new wells, the most recent data from adjacent wells.

SAMPLE CHECK-IN LIST

Date/Time Received: 3-26-96 /0900

SDG#: _____

Work Order Number: _____

SAF #: B96-083

Shipping Container ID: RM #7 Chain of Custody # _____

1. Custody Seals on shipping container intact? Yes No
2. Custody Seals dated and signed? Yes No
3. Sample temperature 2 °C
4. Vermiculite/packing materials is Wet Dry
5. Each sample is in a plastic bag? Yes No
6. Sample holding times exceeded? Yes No

7. Samples have:
 tape hazard labels
 custody seals appropriate sample labels

8. Samples are:
 in good condition leaking
 broken have air bubbles

9. Is the information on the COC and Sample bottles in agreement?

Yes No

Notes: _____

Sample Custodian/Laboratory: Paula Davis / LAS Date: 3-26-96

Telephoned To: Kathleen Hall On 3-26-96 By Paula Davis
Faxed
Per 3-26-96

LOCKHEED MARTIN

Sample Login Login Review Checklist

Lot Number L6677

The login review should be conducted by that person logging in the samples as well as a peer. Please use this checklist to ensure that such reviews occur in a uniform basis. Please sign and date below to verify that a login review has occurred. This checklist should be affixed to each login package prior to distribution.

For effective login review, at a minimum, five reports form the login process are required. These are the COC (or equivalent), the login COC report, the sample summary report, the sample receiving checklist, and the login quotation. Before beginning review, ensure that these five components are available. Jobs with single component samples, the sample summary report may be omitted.

SAMPLE SUMMARY REPORT

YES NO N/A Comment

1. Are all sample ID's correct? X _____
2. Are all samples present? X _____
3. Are all matrices indicated correctly? X _____
4. Are all analyses on the COC logged in for the appropriate samples? X _____
5. Are all analyses logged in for the correct container? X _____
6. Are samples logged in according to LAS batching procedures? X _____

LOGIN CHAIN OF CUSTODY

YES NO N/A Comment

1. Are the collect, receive, and due dates correct for every sample? X _____
2. Have all appropriate comments been indicated in the comment section? X _____

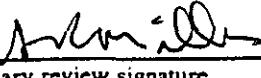
SAMPLE RECEIVING CHECKLIST

YES NO N/A Comment

1. Are all discrepancies between the COC and the login noted (if applicable)? _____ X _____


Paul J. Davis
primary review signature

3-26-88
date


John Miller
secondary review signature

3-26-94
date

00250326059

Lockheed Analytical Services Sample Receiving Checklist

Page 1 of

Client Name: Berthel - Handford

Job No. 46627

Cooler ID: 7-54

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt:

temperature of temp. blank upon receipt:

	Yes	No	Comments/Discrepancies
custody seals intact	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	X		
samples intact	X		
proper container used for sample type	X		
sample volume sufficient for analysis	X		
proper pres. indicated on the COC	X		
VOA's contain headspace			
are samples bi-phasic (if so, indicate sample ID'S):	X		yes

MISCELLANEOUS ITEMS

samples with short holding times Yes No * Comments/Discrepancies
X "Intermittent" This sample was passed
samples to subcontract
THE 48 the Holding Time.

ADDITIONAL COMMENTS/DISCREPACIES

Completed by / date: Paul D. Nass 3-26-96

Sent to the client (date/initials):

**** Client's signature upon receipt:**

*Note: * = contact the appropriate CSR of any discrepancies immediately upon receipt.*

Please review this information and return via facsimile to the sponsor(s) CSR (703) 361-2146.

Lockheed Analytical Laboratory
 SAMPLE SUMMARY REPORT - (su02)
 Bechtel Hanford, Inc. * Richland, WA

Client Sample Number	LA# Sample Number	SDS Number	Matrix	Method
BOH877 -	L6677-1 L6677-2 L6677-12 L6677-13 L6677-14 L6677-14 L6677-14 L6677-14 L6677-14 L6677-14 L6677-15 L6677-16	Water Water Water Water Water Water Water Water Water Water Water Water Water		SCREENING ~ 8260A VOLATILES 6010 ICP METALS 7000 FURNACE ME 300.0 CHLORIDE 300.0 FLUORIDE 300.0 NITRATE ~ 300.0 NITRITE ~ 300.0 PHOSPHATE 300.0 SULFATE GR ALP/BETA LAL U TOTAL KPA (IN
BOH878 -	L6677-17	Filt H2O		6010 ICP METALS
BOH879 -	L6677-7 -	Water		8260A VOLATILES
REPORT TYPE -	L6677-18 L6677-18 L6677-18 L6677-18	Water Water Water Water		EDD - DISK DEL. GCMS2 ~ INORG TYPE 2 RP RAD RPT TYPE 4F

0027 03265

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0H877	Date Collected: 22-MAR-96
Matrix: Water	Date Received: 26-MAR-96
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Chloride	mg/L	300.0	16.	0.020		27-MAR-96	35320	L6677-14
Fluoride	mg/L	300.0	0.27	0.10		28-MAR-96	35321	L6677-14
Nitrate-N	mg/L	300.0	8.1	0.020	H	27-MAR-96	35322	L6677-14
Nitrite-N	mg/L	300.0	< 0.002	0.010	HU	27-MAR-96	35323	L6677-14
Ortho Phosphate	mg/L	300.0	< 0.002	0.10	HU	28-MAR-96	35324	L6677-14
Sulfate	mg/L	300.0	48.	0.10		27-MAR-96	35325	L6677-14

0029

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0H877	Date Collected: 22-MAR-96
Matrix: Water	Date Received: 26-MAR-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
ALUMINUM, TOTAL	mg/l	6010	0.13	0.036	0.20	B	1	25-APR-96	36140	L6677-12
BARIUM, TOTAL	mg/l	6010	0.065	0.0050	0.20	B	1	25-APR-96	36140	L6677-12
BERYLLIUM, TOTAL	mg/l	6010	< 0.0010	0.0010	0.0050	U	1	25-APR-96	36140	L6677-12
CADMIUM, TOTAL	mg/l	6010	< 0.0050	0.0050	0.0050	U	1	25-APR-96	36140	L6677-12
CALCIUM, TOTAL	mg/l	6010	58.	0.0090	5.0		1	25-APR-96	36140	L6677-12
CHROMIUM, TOTAL	mg/l	6010	< 0.0060	0.0060	0.010	U	1	25-APR-96	36140	L6677-12
COBALT, TOTAL	mg/l	6010	< 0.0070	0.0070	0.050	U	1	25-APR-96	36140	L6677-12
COPPER, TOTAL	mg/l	6010	< 0.0070	0.0070	0.025	U	1	25-APR-96	36140	L6677-12
IRON, TOTAL	mg/l	6010	0.24	0.0060	0.10		1	25-APR-96	36140	L6677-12
MAGNESIUM, TOTAL	mg/l	6010	14.	0.066	5.0		1	25-APR-96	36140	L6677-12
MANGANESE, TOTAL	mg/l	6010	0.074	0.0010	0.015		1	25-APR-96	36140	L6677-12
NICKEL, TOTAL	mg/l	6010	< 0.013	0.013	0.040	U	1	25-APR-96	36140	L6677-12
POTASSIUM, TOTAL	mg/l	6010	4.9	1.2	5.0	B	1	25-APR-96	36140	L6677-12
SILVER, TOTAL	mg/l	6010	< 0.0070	0.0070	0.010	U	1	25-APR-96	36140	L6677-12
SODIUM, TOTAL	mg/l	6010	19.	0.039	5.0		1	25-APR-96	36140	L6677-12
VANADIUM, TOTAL	mg/l	6010	< 0.0070	0.0070	0.050	U	1	25-APR-96	36140	L6677-12
ZINC, TOTAL	mg/l	6010	0.0040	0.0030	0.020	B	1	25-APR-96	36140	L6677-12
ANTIMONY, TOTAL	mg/l	7041	< 0.011	0.011	0.060	U	1	25-APR-96	36142	L6677-13
ARSENIC, TOTAL	mg/l	7060	0.0058	0.0030	0.010	B	1	25-APR-96	36142	L6677-13
LEAD, TOTAL	mg/l	7421	< 0.0020	0.0020	0.0030	U	1	25-APR-96	36142	L6677-13
SELENIUM, TOTAL	mg/l	7740	0.0043	0.0030	0.0050	B	1	25-APR-96	36142	L6677-13
THALLIUM, TOTAL	mg/l	7840	< 0.0040	0.0040	0.010	U	1	25-APR-96	36142	L6677-13

0051

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOH878	Date Collected: 22-MAR-96
Matrix: Filt H2O	Date Received: 26-MAR-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
ALUMINUM, DISSOLVED	mg/l	6010	< 0.036	0.036	0.20	U	1	22-APR-96	36145	L6677-17
BARIUM, DISSOLVED	mg/l	6010	0.070	0.0050	0.20	B	1	22-APR-96	36145	L6677-17
BERYLLIUM, DISSOLVED	mg/l	6010	< 0.0010	0.0010	0.0050	U	1	22-APR-96	36145	L6677-17
CADMIUM, DISSOLVED	mg/l	6010	< 0.0050	0.0050	0.0050	U	1	22-APR-96	36145	L6677-17
CALCIUM, DISSOLVED	mg/l	6010	64.	0.0090	5.0		1	22-APR-96	36145	L6677-17
CHROMIUM, DISSOLVED	mg/l	6010	< 0.0060	0.0060	0.010	U	1	22-APR-96	36145	L6677-17
COBALT, DISSOLVED	mg/l	6010	< 0.0070	0.0070	0.050	U	1	22-APR-96	36145	L6677-17
COPPER, DISSOLVED	mg/l	6010	< 0.0070	0.0070	0.025	U	1	22-APR-96	36145	L6677-17
IRON, DISSOLVED	mg/l	6010	< 0.0060	0.0060	0.10	U	1	22-APR-96	36145	L6677-17
MAGNESIUM, DISSOLVED	mg/l	6010	16.	0.066	5.0		1	22-APR-96	36145	L6677-17
MANGANESE, DISSOLVED	mg/l	6010	0.066	0.0010	0.015		1	22-APR-96	36145	L6677-17
NICKEL, DISSOLVED	mg/l	6010	< 0.013	0.013	0.040	U	1	22-APR-96	36145	L6677-17
POTASSIUM, DISSOLVED	mg/l	6010	6.7	1.2	5.0		1	22-APR-96	36145	L6677-17
SILVER, DISSOLVED	mg/l	6010	< 0.0070	0.0070	0.010	U	1	22-APR-96	36145	L6677-17
SODIUM, DISSOLVED	mg/l	6010	20.	0.039	5.0		1	22-APR-96	36145	L6677-17
VANADIUM, DISSOLVED	mg/l	6010	0.0091	0.0070	0.050	B	1	22-APR-96	36145	L6677-17
ZINC, DISSOLVED	mg/l	6010	< 0.0030	0.0030	0.020	U	1	22-APR-96	36145	L6677-17
Antimony	mg/l	6010	< 0.0030	0.0030	0.060	U	1	30-APR-96	36146	L6677-17
Arsenic	mg/l	6010	0.0052	0.0030	0.010	B	1	30-APR-96	36146	L6677-17
Lead	mg/l	6010	< 0.0020	0.0020	0.0030	U	1	30-APR-96	36146	L6677-17
Selenium	mg/l	6010	< 0.0030	0.0030	0.0050	U	1	30-APR-96	36146	L6677-17
Thallium	mg/l	6010	< 0.0050	0.0050	0.010	U	1	30-APR-96	36146	L6677-17

0059

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOH877

LAL Sample ID: L6677-16

Date Collected: 22-MAR-96

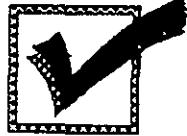
Date Received: 26-MAR-96

Matrix: Water

Login Number: L6677

Conc/Simment	Analyzed	Batch	Activity	Error	MDL	DataQual	Units
Uranium	17-APR-96	U TOTAL KPA (INORG)_35539	9.25	0.48	2.0		ug/L

Lockheed Analytical Laboratory
Metals Analytical Data
Technical Review Checklist
(Analyst)



CODE ANOMALY

- 10 Prep Blank data was not within criteria
 - 11 Laboratory Control Sample was not within criteria
 - 12 Duplicate Precision was not met
 - 13 Matrix Spike recovery was not within criteria
 - 00 Other

Description	Yes	No	Comments
Completeness Review			
1. Were the standard operating procedures (SOP) followed?	✓		-
2. Are all raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	✓		
3. Are all abnormalities in the raw data noted and/or explained?	✓		
4. Were all the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	✓		
Data Quality Assessment			
5. Was the sample properly preserved and analyzed within the method-specified holding time?	✓		
6. Were the instrument calibration criteria met?	✓		
7. Are the initial and continuing calibration verification samples data bracketing the samples of interest within criteria?	✓		
8. Are the bracketing initial and continuing calibration blank data within criteria?	✓		
9. For ICP Only: Are the interference check standard recovery data within criteria?			

Notes and comments:

I certify, to the best of my knowledge, that the data are acceptable and in compliance with the laboratory policies and client requests, except as noted above.

quests,
4/26/96

Mandy Williams 4/24/96
Analyst Signature/Date

Analyst Signature/Date

J. Mitchell-Hall

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LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS
8260 VOLATILES

Client Sample ID:	BOH877	LAL Sample ID:	L6677-2
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC LIMITE
1,2-Dichloroethane-D4	108%	84-122
Toluene-D8	102%	87-117
Bromofluorobenzene	107%	83-118

CONSTITUENT	CAS NO.	RESULT ug/l	PRACTICAL QUANTITATION LIMIT ug/l	DATA QUALIFIERS
Chloromethane	74-87-3	<10.	10.	
Vinyl Chloride	75-01-4	<10.	10.	
Bromomethane	74-83-9	<10.	10.	
Chloroethane	75-00-3	<10.	10.	
Fluorotrichloromethane	75-69-4	2.2	5.0	J
Acetone	67-64-1	5.7	100	BJ
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Vinyl Acetate	108-05-4	<5.0	5.0	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	<5.0	5.0	
Carbon Tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene (TCE)	79-01-6	<5.0	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
2-Hexanone	591-78-6	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
Chlorodibromomethane	124-48-1	<5.0	5.0	
Tetrachloroethene (PCE)	127-18-4	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylenes	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	
Acetonitrile	75-05-8	<50.	50.	
Acrolein	107-02-8	<50.	50.	0085

LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS

8260 VOLATILES

Client Sample ID:	BOH877	LAL Sample ID:	L6677-2
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

CONSTITUENT	CAS NO.	RESULT ug/l	PRACTICAL QUANTITATION LIMIT ug/l	DATA QUALIFIER(s)
Acrylonitrile	107-13-1	<15.	15.	
Allyl Chloride	107-05-1	<5.0	5.0	
Chloroprene	126-99-8	<10.	10.	
1,2-Dibromoethane	106-93-4	<5.0	5.0	
Dibromomethane	74-95-3	<5.0	5.0	
Dichlorodifluoromethane	75-71-8	<5.0	5.0	
1,4-Dioxane	123-91-1	<200	200	
Ethyl Cyanide	107-12-0	<10.	10.	
Ethyl Methacrylate	97-63-2	<5.0	5.0	
Iodomethane	74-88-4	<5.0	5.0	
Isobutanol	78-83-1	<100	100	
Methacrylonitrile	126-98-7	<5.0	5.0	
Methyl Methacrylate	80-62-6	<5.0	5.0	
1,1,1,2-Tetrachloroethane	630-20-6	<5.0	5.0	
1,2,4-Trichlorobenzene	120-82-1	<5.0	5.0	
1,2,3-Trichloropropane	96-18-4	<5.0	5.0	

0086

LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS
TENTATIVELY IDENTIFIED COMPOUNDS
8260 VOLATILES

Client Sample ID: BOH877
Date Collected: 22-MAR-96
Date Analyzed: 02-APR-96
Matrix: Water

LAL Sample ID: L6677-2
Date Received: 26-MAR-96
Analytical Dilution: 1
Analytical Batch ID: 040296-8260-D1
Preparation Dilution: 1.00

CONCENTRATION UNITS:

Number of TICs found: 0

(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST CONC.	Q
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

0087

LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS
8260 VOLATILES

Client Sample ID:	BOH879	LAL Sample ID:	L6677-7
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC LIMITS
1,2-Dichloroethane-D4	113%	84-122
Toluene-D8	107%	87-117
Bromofluorobenzene	111%	83-118

CONSTITUENT	CAS NO.	RESULT UG/L	PRACTICAL QUANTIFICATION LIMIT UG/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	<10.	10.	
Vinyl Chloride	75-01-4	<10.	10.	
Bromomethane	74-83-9	<10.	10.	
Chloroethane	75-00-3	<10.	10.	
Fluorotrichloromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	5.8	100	BJ
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Vinyl Acetate	108-05-4	<5.0	5.0	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	<5.0	5.0	
Carbon Tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene (TCE)	79-01-6	<5.0	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
2-Hexanone	591-78-6	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
Chlorodibromomethane	124-48-1	<5.0	5.0	
Tetrachloroethene (PCE)	127-18-4	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylenes	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	
Acetonitrile	75-05-8	<50.	50.	
Acrolein	107-02-8	<50.	50.	0088

LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS
8260 VOLATILES

Client Sample ID:	BOH879	LAL Sample ID:	L6677-7
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Acrylonitrile	107-13-1	<15.	15.	
Allyl Chloride	107-05-1	<5.0	5.0	
Chloroprene	126-99-8	<10.	10.	
1,2-Dibromoethane	106-93-4	<5.0	5.0	
Dibromomethane	74-95-3	<5.0	5.0	
Dichlorodifluoromethane	75-71-8	<5.0	5.0	
1,4-Dioxane	123-91-1	<200	200	
Ethyl Cyanide	107-12-0	<10.	10.	
Ethyl Methacrylate	97-63-2	<5.0	5.0	
Iodomethane	74-88-4	<5.0	5.0	
Isobutanol	78-83-1	<100	100	
Methacrylonitrile	126-98-7	<5.0	5.0	
Methyl Methacrylate	80-62-6	<5.0	5.0	
1,1,1,2-Tetrachloroethane	630-20-6	<5.0	5.0	
1,2,4-Trichlorobenzene	120-82-1	<5.0	5.0	
1,2,3-Trichloropropane	96-18-4	<5.0	5.0	

0089

LOCKHEED ANALYTICAL SERVICES

VOLATILE ORGANICS BY GC/MS
TENTATIVELY IDENTIFIED COMPOUNDS
8260 VOLATILES

Client Sample ID:	BOH879	LAL Sample ID:	L6677-7
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

CONCENTRATION UNITS:

Number of TICs found: 0 (ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1				
2				
3				
4				
5				
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29				

0090

LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT
VOLATILE ORGANICS BY GC/MS

Client Sample ID: BOH879
Date Collected: 22-MAR-96
Date Analyzed: 02-APR-96

LAL Sample ID: 35510MS
Date Received: 26-MAR-96
Analytical Dilution: 1
Analytical Batch ID: 040296-8260-D1
Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC LIMITS
1,2-Dichloroethane-D4	117%	84-122
Toluene-D8	113%	87-117
Bromofluorobenzene	119% *	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	75.	10.	
Vinyl Chloride	75-01-4	70.	10.	
Bromomethane	74-83-9	68.	10.	
Chloroethane	75-00-3	49.	10.	
Fluorotrichloromethane	75-69-4	200	5.0	E
Acetone	67-64-1	6.4	100	BJ
1,1-Dichloroethene	75-35-4	62.	5.0	
Methylene Chloride	75-09-2	58.	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Vinyl Acetate	108-05-4	<5.0	5.0	
1,1-Dichloroethane	75-34-3	58.	5.0	
2-Butanone	78-93-3	<10.	10.	
trans-1,2-Dichloroethene	156-60-5	59.	5.0	
Chloroform	67-66-3	56.	5.0	
1,1,1-Trichloroethane	71-55-6	56.	5.0	
Carbon Tetrachloride	56-23-5	53.	5.0	
1,2-Dichloroethane	107-06-2	54.	5.0	
Benzene	71-43-2	55.	5.0	
Trichloroethene (TCE)	79-01-6	53.	5.0	
1,2-Dichloropropane	78-87-5	55.	5.0	
Bromodichloromethane	75-27-4	52.	5.0	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
2-Hexanone	591-78-6	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	51.	5.0	
trans-1,3-Dichloropropene	10061-02-6	52.	5.0	
1,1,2-Trichloroethane	79-00-5	53.	5.0	
Toluene	108-88-3	53.	5.0	
Chlorodibromomethane	124-48-1	49.	5.0	
Tetrachloroethene (PCE)	127-18-4	38.	5.0	
Chlorobenzene	108-90-7	53.	5.0	
Ethylbenzene	100-41-4	53.	5.0	
m,p-Xylenes	136777-61-2	110	5.0	
o-Xylene	95-47-6	55.	5.0	
Styrene	100-42-5	55.	5.0	
Bromoform	75-25-2	45.	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	52.	5.0	
1,3-Dichlorobenzene	541-73-1	52.	5.0	
1,4-Dichlorobenzene	106-46-7	53.	5.0	
1,2-Dichlorobenzene	95-50-1	53.	5.0	
Acetonitrile	75-05-8	<50.	50.	
Acrolein	107-02-8	<50.	50.	

0094

LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT
VOLATILE ORGANICS BY GC/MS

Client Sample ID: BOH879
Date Collected: 22-MAR-96
Date Analyzed: 02-APR-96

LAL Sample ID: 35510MS
Date Received: 26-MAR-96
Analytical Dilution: 1
Analytical Batch ID: 040296-8260-D1
Preparation Dilution: 1.00

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(s)
Acrylonitrile	107-13-1	<15.	15.	
Allyl Chloride	107-05-1	<5.0	5.0	
Chloroprene	126-99-8	<10.	10.	
1,2-Dibromoethane	106-93-4	52.	5.0	
Dibromomethane	74-95-3	55.	5.0	
Dichlorodifluoromethane	75-71-8	100	5.0	
1,4-Dioxane	123-91-1	<200	200	
Ethyl Cyanide	107-12-0	<10.	10.	
Ethyl Methacrylate	97-63-2	<5.0	5.0	
Iodomethane	74-88-4	<5.0	5.0	
Isobutanol	78-83-1	<100	100	
Methacrylonitrile	126-98-7	75.	5.0	
Methyl Methacrylate	80-62-6	<5.0	5.0	
1,1,1,2-Tetrachloroethane	630-20-6	52.	5.0	
1,2,4-Trichlorobenzene	120-82-1	51.	5.0	
1,2,3-Trichloropropane	96-18-4	50.	5.0	

0095

LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT
VOLATILE ORGANICS BY GC/MS

Client Sample ID:	BOH879	LAL Sample ID:	35510MSD
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
		Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC LIMITS
1,2-Dichloroethane-D4	107%	84-122
Toluene-D8	101%	87-117
Bromofluorobenzene	106%	83-118

CONSTITUENT	CAS. NO.	RESULT	PRACTICAL QUANTITATION LIMIT	DATA QUALIFIER(S)
Chloromethane	74-87-3	71.	10.	
Vinyl Chloride	75-01-4	65.	10.	
Bromomethane	74-83-9	68.	10.	
Chloroethane	75-00-3	160	10.	
Fluorotrichloromethane	75-69-4	180	5.0	
Acetone	67-64-1	6.8	100	BJ
1,1-Dichloroethene	75-35-4	57.	5.0	
Methylene Chloride	75-09-2	54.	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Vinyl Acetate	108-05-4	<5.0	5.0	
1,1-Dichloroethane	75-34-3	54.	5.0	
2-Butanone	78-93-3	<10.	10.	
trans-1,2-Dichloroethene	156-60-5	55.	5.0	
Chloroform	67-66-3	53.	5.0	
1,1,1-Trichloroethane	71-55-6	52.	5.0	
Carbon Tetrachloride	56-23-5	49.	5.0	
1,2-Dichloroethane	107-06-2	51.	5.0	
Benzene	71-43-2	51.	5.0	
Trichloroethene (TCE)	79-01-6	49.	5.0	
1,2-Dichloropropane	78-87-5	52.	5.0	
Bromodichloromethane	75-27-4	48.	5.0	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
2-Hexanone	591-78-6	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	48.	5.0	
trans-1,3-Dichloropropene	10061-02-6	49.	5.0	
1,1,2-Trichloroethane	79-00-5	51.	5.0	
Toluene	108-88-3	49.	5.0	
Chlorodibromomethane	124-48-1	46.	5.0	
Tetrachloroethene (PCE)	127-18-4	35.	5.0	
Chlorobenzene	108-90-7	48.	5.0	
Ethylbenzene	100-41-4	49.	5.0	
m,p-Xylenes	136777-61-2	100	5.0	
o-Xylene	95-47-6	50.	5.0	
Styrene	100-42-5	50.	5.0	
Bromoform	75-25-2	42.	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	49.	5.0	
1,3-Dichlorobenzene	541-73-1	46.	5.0	
1,4-Dichlorobenzene	106-46-7	48.	5.0	
1,2-Dichlorobenzene	95-50-1	48.	5.0	
Acetonitrile	75-05-8	<50.	50.	
Acrolein	107-02-8	<50.	50.	0096

LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT
VOLATILE ORGANICS BY GC/MS

Client Sample ID: BOH879
Date Collected: 22-MAR-96
Date Analyzed: 02-APR-96

LAL Sample ID: 35510MSD
Date Received: 26-MAR-96
Analytical Dilution: 1
Analytical Batch ID: 040296-8260-D1
Preparation Dilution: 1.00

CONSTITUENT	CAS. NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Acrylonitrile	107-13-1	<15.	15.	
Allyl Chloride	107-05-1	<5.0	5.0	
Chloroprene	126-99-8	<10.	10.	
1,2-Dibromoethane	106-93-4	49.	5.0	
Dibromomethane	74-95-3	52.	5.0	
Dichlorodifluoromethane	75-71-8	94.	5.0	
1,4-Dioxane	123-91-1	<200	200	
Ethyl Cyanide	107-12-0	<10.	10.	
Ethyl Methacrylate	97-63-2	<5.0	5.0	
Iodomethane	74-88-4	<5.0	5.0	
Isobutanol	78-83-1	<100	100	
Methacrylonitrile	126-98-7	68.	5.0	
Methyl Methacrylate	80-62-6	<5.0	5.0	
1,1,1,2-Tetrachloroethane	630-20-6	49.	5.0	
1,2,4-Trichlorobenzene	120-82-1	48.	5.0	
1,2,3-Trichloropropane	96-18-4	47.	5.0	

0097

LOCKHEED ANALYTICAL SERVICES

MATRIX SPIKE DATA SUMMARY
VOLATILE ORGANICS BY GC/MS

Client Sample ID:	BOH879	IAL Sample ID:	35510MS
Date Collected:	22-MAR-96	Date Received:	26-MAR-96
Date Analyzed:	02-APR-96	Analytical Dilution:	1
		Analytical Batch ID:	040296-8260-D1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-D4	117%	84-122
Toluene-D8	113%	87-117
Bromofluorobenzene	119% *	83-118

Constituent	Spike Added ug/L	Sample Concentration ug/L	MS Concentration ug/L	% Recovery	QC Limits
1,1-Dichloroethene	50.0	0.462	61.6	122	62-124
Benzene	50.0	0.339	55.0	109	68-128
Trichloroethene (TCE)	50.0	0.524	52.9	105	65-125
Toluene	50.0	0.466	53.5	106	69-129
Chlorobenzene	50.0	0.368	53.0	105	68-128

0102

LOCKHEED ANALYTICAL SERVICES

MATRIX SPIKE DUPLICATE DATA SUMMARY
VOLATILE ORGANICS BY GC/MS

Client Sample ID: BOH879
Date Collected: 22-MAR-96
Date Analyzed: 02-APR-96

LAL Sample ID: 35510MSD
Date Received: 26-MAR-96
Analytical Dilution: 1
Analytical Batch ID: 040296-8260-D1
Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-D4	107%	84-122
Toluene-D8	101%	87-117
Bromofluorobenzene	106%	83-118

Constituent	Spike Added ug/L	MSD Concentration ug/L	% Recovery	GC Limits		
				RPD	RPD	% Recovery
1,1-Dichloroethene	50.0	57.3	114	7	14	62-124
Benzene	50.0	50.6	101	8	11	68-128
Trichloroethene (TCE)	50.0	48.6	96	9	14	65-125
Toluene	50.0	48.7	96	10	13	69-129
Chlorobenzene	50.0	48.5	96	9	13	68-128

0103

LOCKHEED ANALYTICAL SERVICES

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Instrument ID: GC\MS-D

Date/Time Analyzed: 02-APR-96 09:12
LAL Batch ID: 040296-8260-D1

		IS1 (PFB) Area	RT	IS2 (DFB) Area	RT	IS3 (CBZ) Area	RT	IS4 (DCB) Area	RT
12 HOUR STD		675912	11.05	1078549	12.19	1147471	16.29	922343	20.35
UPPER LIMIT		1351824	11.55	2157098	12.69	2294942	16.79	1844686	20.85
LOWER LIMIT		337956	10.55	539274	11.69	573735	15.79	461171	19.85
Client Sample ID	LAL Sample ID								
BOH879	35510MS	566680	11.06	921667	12.20	961894	16.31	927047	20.36
BOH877	L6677-2	583023	11.06	922467	12.20	984319	16.31	898079	20.35
BOH879	L6677-7	585377	11.06	952817	12.20	996996	16.31	909309	20.35
Method Blank	MB35510	604511	11.06	951069	12.20	1008144	16.32	948514	20.36
BOH879	35510MSD	580986	11.06	953743	12.20	1010416	16.32	976498	20.36
Lab Ctrl Sample	LCS35510	658623	11.06	1051570	12.20	1107504	16.31	1075003	20.36

AREA UPPER LIMIT = +100% of internal standard area
 AREA LOWER LIMIT = -50% of internal standard area
 RT UPPER LIMIT = +0.50 minutes of internal standard RT
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

IS1 (PFB) = Pentafluorobenzene
 IS2 (DFB) = 1,4-Difluorobenzene
 IS3 (CBZ) = Chlorobenzene-d5
 IS4 (DCB) = 1,4-Dichlorobenzene-d4

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BOH877

LAL Sample ID: L6677-15

Date Collected: 22-MAR-96

Date Received: 26-MAR-96

Matrix: Water

Login Number: L6677

Constituent	Analyzed	Batch	Activity	Error	MDA	StateQual	Units
Gross Alpha	09-APR-96	GR ALP/BETA	LAL-0060_35168	8.0	2.9	2.6	C pCi/L
Gross Beta	09-APR-96	GR ALP/BETA	LAL-0060_35168	19.3	2.5	2.3	pCi/L

LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR GROSS ALPHA/BETA ANALYSIS

LAL-91-SOP-0060

Date Prep Started :

Workgroup Number : GR ALP/BETA LAL-0060 35168

Matrix : Water

Prep Due Date : 04/01/96 4/9/96

CLIENT SAMPLE ID	LAL ID	QC	CHILD LAL ID	pH <2	ALOT VOL (L)	PLANCHET TARE WT (grams)	PLANCHET GROSS WT (grams)	*	SAMPLE WEIGHT (grams)	COMMENTS
L6649-13	35168DUP1	1	DUP1	35168-01	2	130	8.5449	8.6430		
Lab Ctr Sample	35168LCS1	2	LCS1	35168-02		.250	8.5547	8.5934		
Method Blank	35168MBB	3	MBB1	35168-03		.250	8.5364	8.5364		
L6661-13	35168MS1	4	MS1	35168-04		.220	8.5968	8.6998		
B0H8G2	L6649-13	5	SMP1	35168-05		.130	8.5863	8.6827		
B0H8F0	L6661-13	6	MSS1	35168-06		.220	8.6198	8.7263		
B0H877	L6677-15	7		35168-07		.250	8.5412	8.6489		
		8								
		9								
		10								
		11								
		12								
		13								
		14								
		15								
		16								
		17								
		18								
		19								
		20								
		21								
		22								
		23								
		24								
LCS Volume & RefDate	1.0 mL	8/1/90	MS Volume & RefDate	1.0 mL	11/5/96	Prep Anlist	CD			
LCS Nuclide	Am-241	Sr-90	MS Nuclide	Am-241	Sr-90	Start Date	4/7/96			
LCS Activity	9.81 pCi/mL	12.6 pCi/mL	MS Activity	8.40 pCi/mL	8.37 pCi/mL	Count Anlist				
LCS ID #	95-721-13-1		MS ID #	94-G77-93-1						

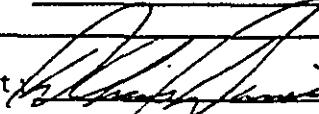
Balance Number : 40020046 ()

Pipette Number : 71008 ()

LCS added by: _____
Witnessed by: _____

Comments : _____

0
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2

Analyst:  Checked by: DV

Cnt Rm Custody Date: SV 4-8-76 V95224

LOCKHEED ANALYTICAL LABORATORY
 SAMPLE PREPARATION LOG FOR GROSS ALPHA/BETA ANALYSIS
 LAL-91-SOP-0060

Date Prep Started : 4/8/96
 Workgroup Number : GR ALP/BETA LAL-0060 35168

Matrix : Water
 Prep Due Date : 04/01/96

CLIENT SAMPLE ID	LAL ID	QC	CHILD LAL ID	pH <2	ALOT VOL (L)	PLANCHET TARE WT (grams)	PLANCHET GROSS WT (grams)	*	SAMPLE WEIGHT (grams)	COMMENTS	
L6649-13	35168DUP1	1 DUP1	35168-01	2	0.130	8.5449	8.6430	*	0.0981		
Lab Ctrl Sample	35168LCS1	2 LCS1	35168-02	2	0.250	8.5547	8.5934	*	0.0387		
Method Blank	35168MBB	3 MBB1	35168-03	2	0.250	8.5364	8.5364	*	0.0000		
L6661-13	35168MS1	4 MS1	35168-04	2	0.220	8.5968	8.6998	*	0.1030		
BOH8G2	L6649-13	5 SMP1	35168-05	2	0.130	8.5863	8.6827	*	0.0964		
BOH8F0	L6661-13	6 MSS1	35168-06	2	0.220	8.6198	8.7263	*	0.1065		
BOH877	L6677-15	7	35168-07	2	0.250	8.5412	8.6489	*	0.1077		
	8							*			
	9							*			
	10							*			
	11							*			
	12							*			
	13							*			
	14							*			
	15							*			
	16							*			
	17							*			
	18							*			
	19							*			
	20							*			
	21							*			
	22							*			
	23							*			
	24							*			
LCS Volume & RefDate	1.0 mL; 08/01/90				MS Volume & RefDate	1.0 mL; 01/05/96				Prep Anlist	CD
LCS Nuclide	Am-241		Sr-90		MS Nuclide	Am-241		Sr-90		Start Date	4/8/96
LCS Activity	9.8 pCi/mL		12.0 pCi/mL		MS Activity	8.4 pCi/mL		8.4 pCi/mL		Count Anlist	
LCS ID #	95-721-13-1				MS ID #	94-677-93-1					

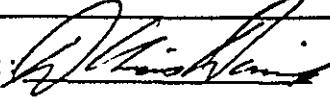
Balance Number : 40020046 ()
 ()

Pipette Number : 71008 ()
 ()

LCS added by: CD
 Witnessed by: NA

Comments :

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8

Analyst :  Checked by: 

V95224

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	<u>Am-241 and SrY-90</u>
Parent Barcode Number	<u>AA0030</u> <u>Am-241</u> <u>IPL 388-100-1</u> <u>SrY-90</u> <u>NIST SRM 4219G</u> <u>Am-241</u> <u>91-0225-60-1</u> <u>SrY-90</u> <u>91-0225-30-2</u>
Vendor or Certificate I.D. # of Parent Standard:	
Diluted Source Logbook I.D. #:	
Balance Verification?:	<u>Yes</u>
Diluent Used:	<u>0.1N HNO₃</u>

Dilution	
*Diluent:	<u>0.1N HNO₃ + 42mg Sr(NO₃)₂/mL</u>
*Density of diluent (g/ml):	<u>NA</u>
a: Parent Specific Activity:	<u>Am-241 9.81 pCi/mL</u> <u>Sr-90 600 pCi/mL on 8/1/90</u>
b: Amount of Source Transferred:	<u>Am-241 0.5 mL</u> <u>Sr-90 0.5 mL</u>
c: Total amount of Dilution:	<u>500 mL</u>
d: Total Volume of Dilution:	<u>500 mL</u>
e: Activity of Dilution [a * b / c]:	<u>NA</u>
f: Activity of Dilution (a * b / d):	<u>Am-241 9.81 pCi/mL</u> <u>Sr-90 12 pCi/mL on 8/1/90</u>
Dilution Logbook I.D. #:	<u>95-721-13-1</u>
Prepared By:	<u>Joe Hutchinson</u>
Reviewed By:	<u>J. C. M.</u>
Preparation Date:	<u>8/23/95</u>
Review Date:	<u>8/24/95</u>
*If the diluent remains unchanged from the diluent used for the dilution source, then a weight dilution of a volume unit source can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.	

Read and Understood By

0122

Signed

Date

Signed

Date

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radioisotope: Am-241
Half Life: 432.7 ± 0.5 years
Catalog No.: 7241
Source No.: 388-100-1

Customer: LOCKHEED ENGINEERING & SCIENCES Co
P.O. No.: 06LAB1245
Reference Date: November 1 1991 12:00 PST.
Contained Radioactivity: 0.997 μCi

Description of Solution

a. Mass of solution: 5.0007 gram .
b. Chemical form: AmCl₃ in 0.5N HCl
c. Carrier content: None added
d. Density: 1.0077 gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None detected

Radionuclide Concentration

0.1994

$\mu\text{Ci}/\text{gram}$.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ± 2.0%
b. Random uncertainty in assay: ± 0.7%
c. Random uncertainty in weighing(s): ± 0.0%
d. Total uncertainty at the 99% confidence level: ± 2.7%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)



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1800 No. Keystone Street,
Burbank, California 91504
(818) 843 - 7000

Gary J. Gilmore
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0123



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WHICH IS BEING MAILED TO YOU UNDER
SEPARATE COVER.

National Institute of Standards & Technology

Certificate

Standard Reference Material 4919-G Radioactivity Standard

Radionuclide	Strontium-90
Source identification	4919-G
Source description	Solution in NIST borosilicate-glass ampoule ⁽¹⁾
Solution composition	Strontium-90 plus yttrium-90 plus approximately 95 µg each of non-radioactive strontium and yttrium per gram of 1-molar hydrochloric acid ⁽²⁾
Mass	Approximately 5.0 grams
Radioactivity concentration	$4.514 \times 10^3 \text{ Bq g}^{-1}$
Reference time	1200 EST August 1, 1990
Overall uncertainty	1.05 percent ⁽³⁾
Photon-emitting impurities	None observed ⁽⁴⁾
Alpha-particle-emitting impurities	None observed ⁽⁵⁾
Half life	$28.5 \pm 0.2 \text{ years}$ ⁽⁶⁾
Measuring instrument	$4\pi\beta$ liquid-scintillation counter

This standard reference material was prepared in the Center for Radiation Research, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppe, Group Leader.

Gaithersburg, MD 20899
February, 1991

William P. Reed, Acting Chief
Office of Standard Reference Materials

*Notes on back

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide	Am-241	Customer:	LOCKHEED ENGINEERING & SCIENCES Co.
Half Life:	432.7 ± 0.5 years	P.O.No.:	06LAB1245
Catalog No.:	7241	Reference Date:	November 1 1991
Source No.:	388-100-1	Contained Radioactivity:	0.997 μCi .

Description of Solution

a. Mass of solution:	5.0007	grams.
b. Chemical form:	AmCl ₃ in 0.5N HCl	
c. Carrier content:	None added	
d. Density:	1.0077	gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None detected

Radionuclide Concentration0.1994 $\mu\text{Ci}/\text{gram}$.**Method of Calibration**

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

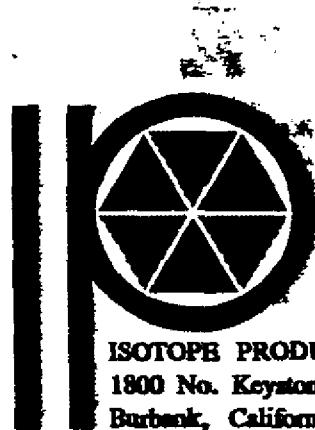
a. Systematic uncertainty in instrument calibration:	±2.0%
b. Random uncertainty in assay:	±0.7%
c. Random uncertainty in weighing(s):	±0.0%
d. Total uncertainty at the 99% confidence level:	±2.7%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)



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CERTIFICATE OF CALIBRATION BETA STANDARD SOLUTION

Radionuclide	Sr-90	Customer:	LOCKHEED ENGINEERING & SCIENCES Co.
Half Life:	28.5 ± 0.2 years	P.O.No.:	06LAB1245
Catalog No.:	7090	Reference Date:	November 1 1991
Source No.:	388-99-2	Contained Radioactivity:	1.018 μCi .

Description of Solution

a. Mass of solution:	5.0012	grams.
b. Chemical form:	SrCl ₂ in 0.1N HCl	
c. Carrier content:	None added	
d. Density:	0.9996	gram/ml @ 20°C.

Radioimpurities

None (Y-90 daughter in equilibrium)

Radioactive Daughters

Y-90 daughter in equilibrium

Radionuclide Concentration

0.203 $\mu\text{Ci}/\text{gram}$.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	± 1.5%
b. Random uncertainty in assay:	± 0.5%
c. Random uncertainty in weighing(s):	± 0.0%
d. Total uncertainty at the 99% confidence level:	± 2.0%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)



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QUALITY CONTROL

**SECONDARY/WORKING LEVEL
STANDARD DILUTION RECORD**

Dilution Source Information			
Isotope:	(432.7 ^y)	(29.1 ^y)	
Am-241	;	Sr/Y 90	MS
Parent Logbook Number	92-353-81-1	;	94-0677-92-1
Vendor or Certificate I.D. # of Parent Standard:			
Diluted Source Logbook I.D. #:	See ABOVE		
Balance Verification?:	Yes		
Diluent Used:	1 M HNO ₃		

Dilution			
*Diluent:	1 M HNO ₃ + 10 ml Sr Carrier (ICN/2)		
*Density of diluent (g/ml):	1.0290	g/ml	
a: Parent Specific Activity:	Am-241	Sr/Y-90 *	
	1002.4	; 1000.2	pCi/g @ 1/5/96
b: Amount of Source Transferred:	4.070	;	4.065 g
c: Total amount of Dilution:	500.01 g		
d: Total Volume of Dilution:	514.5	ml	
e: Activity of Dilution [a * b / c]:	Am-241	Sr/Y - 90	
	8.16	8.13	pCi/g @ 1/5/96
f: Activity of Dilution (a * b / d):	8.40	8.37	pCi/ml
Dilution Logbook I.D. #:	94-0677-93-1		
* Sr/Y-90 in equilibrium. Activity reported = known Sr 90 activity * 2.			
Prepared By:	<u>J. C. Monk</u>	Preparation Date:	<u>1/5/96</u>
Reviewed By:	<u>Joe Hutchinson</u>	Review Date:	<u>1/5/96</u>
If the diluent remains unchanged from the diluent used for the dilution source, then a weight dilution of a volume unit source can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.			
Read and Understood By _____			

Signed	Date	Signed	Date
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INITIAL STANDARD DILUTION RECORD

Standard Information:	
Isotope:	<u>Sr - 90</u>
Activity of Standard Received:	<u>1.018</u> <u>5.007</u> uCi
Weight of Standard Received (g):	<u>5.0012</u> g
Standard Activity (pCi/g):	<u>2.036 E 5</u> pCi/g
Halflife in Years or Days:	<u>29.1</u> yrs
Reference Date:	<u>11/1/91</u>
Vendor:	<u>IPL</u>
Vendor I.D. #:	<u>—</u>
LAL I.D. #:	<u>AA 0049</u>
NIST Traceable ?	<u>Yes</u>
Certificate #:	<u>388-99-2</u>
Receiver's Name:	<u>FREE</u>
Date Received:	<u>12/91</u>

Primary Dilution	
Balance Verification?:	<u>Yes</u>
Diluent Used:	<u>1 M HNO₃</u> (<u>1.0290 g/ml</u>)
a: Decay Corrected Standard Activity (pCi/g):	<u>1.844 E 5</u> pCi/g @ <u>1/5/96</u>
b: Weight of the Source Transferred (g):	<u>4.949</u> g
c: Total diluted weight (g):	<u>100.01</u> g
d: Total Diluted Volume (mL)	<u>97.19</u> mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	<u>9125.0</u> pCi/g @ <u>1/5/96</u>
f: Calculated Density of Solution (g/ml) [c / d]:	<u>1.0290</u> g/mL
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	<u>9389.8</u> pCi/mL
h. Dilution Logbook I.D. #:	<u>94-0677-91-1</u>
Prepared By: <u>J. C. Marshall</u>	Preparation Date: <u>1/5/96</u>
Reviewed By: <u>Joe Hutchinson</u>	Review Date: <u>1/5/96</u>
Purity/Cross Check Performed By: _____	Check Date: _____

Signed	Date	Signed	Date
0130			

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	<u>Sr-90</u>
Parent Barcode Number:	<u>AA00049</u>
Vendor or Certificate I.D. # of Parent Standard:	<u>94-0677-91-1 388-99-2</u>
Diluted Source Logbook I.D. #:	<u>94 - 0677-91-1</u>
Balance Verification?:	<u>Yes</u>
Diluent Used:	<u>1.0 M HNO₃</u>

Dilution	
*Diluent:	<u>1.0 M HNO₃</u>
*Density of diluent (g/ml):	<u>1.0290</u> g/ml
a: Parent Specific Activity:	<u>9125.0</u> pCi/g <u>© 1/5/96</u>
b: Amount of Source Transferred:	<u>6.012</u> g
c: Total amount of Dilution:	<u>109.70</u> g
d: Total Volume of Dilution:	<u>106.61</u> ml
e: Activity of Dilution [a * b / c]:	<u>500.09</u> pCi/g <u>1/5/96</u>
f: Activity of Dilution (a * b / d):	<u>514.6</u> pCi/ml
Dilution Logbook I.D. #:	<u>94 - 0677-92-1</u>
Prepared By: <u>Agj C.M.d</u>	Preparation Date: <u>1/5/96</u>
Reviewed By: <u>Joe Hutchinson</u>	Review Date: <u>1/8/96</u>

*If the diluent remains unchanged from the diluent used for the dilution source, then a weight dilution of a volume unit source can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.

Read and Understood By

Signed

Date

Signed

Date

0131

ISOTOPE DILUTION RECORD

Isotope: Am-241

Secondary/Working Level Dilution

Date: 4-9-93 Preparer's Name: A. WongFyne
W.
4-9-93

Pipet Check / Balance Wt. Check Done (✓)

Diluted Source ID (log#): 91-225-60-1Diluent used: 0.5 N HClA: Source activity: 21700 dpm/g (9774.8 pCi/g)B: Amount of source transferred: 10.3235 gC: Total amount of dilution: 100.1029 gD: Activity of dilution (A*B/C): 2237.90 dpm/gE: Density of Diluent: 1.0010 g/mlF: Activity by volume (D*E): 2240.14 dpm/mlDilution Log Book ID: 92-335 ^{new} 92-353-81-1Reviewed by: EJ Date: 4/9/931.6" diameter filter LCS in Gamma Spec (555) 5/18/93
(in petri dish and sealed)Prepared by: Lee Van Vugy 5/10/93 — Cut Whatman Glass Micro-
Fibers (Cellular paper originally 3" dia.) to 1.6" dia. — P. petted on filter.Cs-137-0199-0.200 ul * 975.18 pCi/ml = 195.0 pCi (± 197.8 pCi 4-2-91)60Co-00225-80-1 0.200 ul * 1998.11 pCi/ml = 199.6 pCi (± 209.1 pCi 4-2-91) Continued on Page N/A(same particle amounts as p. 80)

Read and Understood By

Fyne (Wong)

Signed

4-9-93

Date

Jayell S. Schott

Signed

5-18-93

Date